

National Radio Astronomy Observatory

Charlottesville, Virginia

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To: D. Hogg, Jim Coe, Barry Clark, Denis Elliott, Chuck Moore.

From: Mel Wright

Subject: The Following is a list, not complete!, of problems which occurred during the run with the H-line Interferometer.

- A. Problems
- B. Loss of Data
- C. Comments

Moral: Don't rush it next time.

A. PROBLEMS

1. Problem: Frequency synthesiser taken out of computer control to avoid problem 5. Computer assumes synthesiser is under its control -- baselines and phases wrong.

Discovered: In IBM printout after 3 days.

Solution: Correct baselines and phases. Leave synthesiser under computer control. Avoidance: Better communications, more tests before observing.

2. Problem: Precession of coordinates in wrong direction -- miss-pointing of telescopes and phases wrong.

Discovered at end of 1st week during pointing.

Solution: A) Correction of precession program.

B) Correction of Data by:

- 1) correct source positions and phases
- 2) small sources: multiply to correct for attenuation
- 3) large sources: separately invert and correct for

offset polar diagram data from this configuration - messy, and loss in signal to noise.

C) Re-observe this configuration

Avoidance: more tests before and during observing.

3. Problem: Intermittent auto-correlator malfunction during 1st week.

Discovered on chart recorders and IBM printout

Solution: Mend correlator. Fault on long baseline which was re-observed later.

Avoidance: Longer checkout of correlator?

4. Problem: No continuum data recorded.

Discovered: In IBM printout in 1st few days.

Solution: Correction to DDP program. Re-observe 1st week.

Avoidance: More tests/time before observing

5. Problem: Large phase-frequency effect due to unbalanced cable lengths at variable IF frequency.

Discovery: In IBM printout.

Solution: Software correction transferred from IBM to DDP after 4th week.

Avoidance: More tests/time before observing.

6. Problem: 30 MHz interference.

Discovery: Test period

Solution: Phase-switch must be used. Calibration with correlated noise source not possible.

Avoidance: ?

7. Problem: Sorting out gain settings for line and continuum.

Discovery: Now and then.

Solution: Sort it out.

Avoidance: Set and record the continuum gains from source cards under computer control

8. Problem: Ratio's of calibrator gains not consistent with accepted fluxes.

Discovery: During calibration of data

Solution: Best procedure probably is to refer each source to its own calibrator. Cause not yet known.

Avoidance: More consistency checks during observing. The chart recorders were not good enough for this.

9. Problem: sense of phase is not always consistent with the positive to N and E convention.

Discovered: Upon trying to make baseline corrections on IBM.

Solution: Reverse sense of phase in appropriate correlators

viz.	BL12	BL23	Continuum
	RX-AB	B/W's	5MHz, 2.5 MHz, 312 MHz, 156 kHz
	RX-CD		10 MHz, 1.25 MHz, 625 kHz, 78 kHz, 39 kHz

for our set-up.

Avoidance: Effect is due to LO's in correlator and hardware (?) in continuum.
Better taken out in DDP on line.

B. LOSS OF DATA

Scans

Scans LostCauseWeek 1

8 scans

delays

Week 2

50 scans

delays 30 scans

30 scans

system phase chaotic (?) why

Week 3

90 scans

missing from data tape
 computer malfunction
 B/W recorded wrongly but data
 OK.

Week 4

5

System phase less stable all
 week. Especially 1st 3 days.
 Interference

Week 5

7

RX-AB bad (?)

3

RX-CD bad

Week 6

2

All bad (?) 35

Week 7

27

A/C RX-CD bad

Week 8

4 scans

LO off

Week 9

5

card reader ignoring

4

cor-1, unknown

10

cor-3, unknown

9

delays

Total Loss (not including writing off whole 1st week)

309 scans

Total observed. 4770 scans

Loss % 6.4%

This figure does not include the 5% of data which is lost due to DDP116 slipping a bit on writing data.

C. COMMENTS

1. In almost all cases the problems could probably have been avoided had more time been given to checkouts and tests before and during observing.
2. The concept of a test period was a good one. That some observing was actually accomplished in this period is a tribute to Barry's programming skills. That we partially failed to debug the system in that time is largely attributable to a) lack of time. There were many programming changes between the test period and observing. b) lack of communication between Barry and myself.
3. The on-line data display is adequate in principle. As a personal prejudice I would like to be able to see good, big fringes (howbeit phase switched if necessary) from which I can measure flux ratio's and see phase changes. The spectral display should be at eye-level as should the good, big fringes.

A hard copy facility for producing scan-averaged spectra (amplitude and phase) would be an asset.

4. The problems 7 and 9 contain two suggested modifications to the DDP program.